

REMARKS

Claims 1 and 8 have been amended. Claims 2, 3, 9, 10 and 15-17 have been canceled. Thus, claims 1, 4-8 and 11-14 are now presented for examination. Support for the amendment to claim 1 may be found in claims 2, 3, 15, and 16, and in the specification at paragraphs [0038], [0042] and [0070]. Support for the amendment to claim 8 may be found in claims 9, 10, 15, and 17, and in the specification at paragraphs [0038], [0042] and [0070]. Thus, no new matter has been added. Reconsideration and withdrawal of the present rejections in view of the comments presented herein are respectfully requested.

Obviousness-type double patenting

Claims 1-17 were rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 1-17 of commonly owned, copending Application No. 11/628,172. Enclosed herewith is a Terminal Disclaimer, thus overcoming this rejection.

Rejections under 35 U.S.C. 102(b)

Japanese Patent Application No. 2003/223001

Claims 1-17 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Japanese Patent Application No. 2003/223001 (herein referred to as JP'001).

JP'001 describes a positive resist composition comprising: (A) a resin which contains a repeating unit represented by general formula (I) and a repeating unit containing a group represented by -COOR (wherein, R represents a hydrocarbon group containing an aliphatic cyclic group, with a proviso that when the carbon atom bonded to the group "-COO" is a tertiary carbon atom, R represents a non-acid dissociable hydrocarbon group containing an aliphatic cyclic group), and exhibits increased solubility in an alkali developing solution under action of an acid; and (B) a compound which generates an acid by irradiation of an active light or radiation.

JP'001 discloses various kinds of repeating units, including those having a hydroxyl group-containing aliphatic hydrocarbon group represented by general formula (III) (paragraphs [0054] to [0064]), and various kinds of repeating units containing a lactone ring (paragraphs [0065] to [0105]). In addition, this reference teaches that an aliphatic cyclic hydrocarbon group included in the repeating unit represented by general formula (I) may be monocyclic or polycyclic, and provides various specific examples thereof.

Comparison between present claim 1 and JP'001:

JP'001 does not disclose a resin comprising the specific combination of structural units as recited in amended claim 1. Therefore, claim 1 is not anticipated by this reference. Thus, reconsideration and withdrawal of the rejection under 35 USC § 102(b) are respectfully requested. In addition, claim 1 is not obvious over this reference for the reasons provided below.

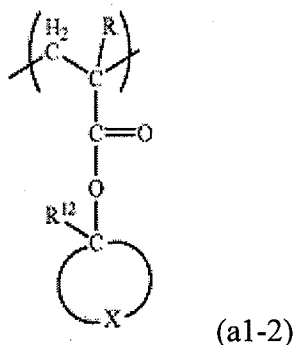
JP'001 describes that the object to be solved lies in providing a positive photoresist composition for excellent far-ultraviolet exposure with wide defocus latitude in an isolated line pattern. The resin in JP'001 indispensably contains a repeating unit represented by general formula (I) and a repeating unit containing a group represented by -COOR (wherein, R represents a hydrocarbon group containing an aliphatic cyclic group, with a proviso that when the carbon atom bonded to the group "-COO" is a tertiary carbon atom, R represents a non-acid dissociable hydrocarbon group containing an aliphatic cyclic group). Also, various structural units are described as optional structural units, including structural units containing a hydroxyl group-containing aliphatic hydrocarbon group represented by general formula (III), and a great variety of structural units containing a lactone ring. An acid dissociable, dissolution inhibiting group within the repeating unit represented by general formula (I) of JP'001 may be monocyclic or polycyclic, and in all the Examples of JP'001, only polycyclic aliphatic hydrocarbon groups are used as acid dissociable, dissolution inhibiting group (paragraphs [0190] to [192]). Therefore, it is clear that, in JP'001, as long as the two indispensable structural units described above are present, the effects of JP'001 can be attained, regardless of the structural unit included in the resin component.

The present specification (US 2006/0182876) at paragraph [0017] discloses that:

However, investigations conducted by the inventors of the present invention have revealed that resists that use a base resin containing the aforementioned type of polycyclic aliphatic hydrocarbon group as a protective group do not provide entirely satisfactory levels of resolution or depth of focus.

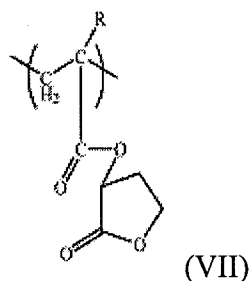
The presently claimed resin, which avoids such types of compounds, comprises the following structural units, unexpectedly results in better resolution and depth of focus compared with JP'001 as described below.

- Structural unit (a1)



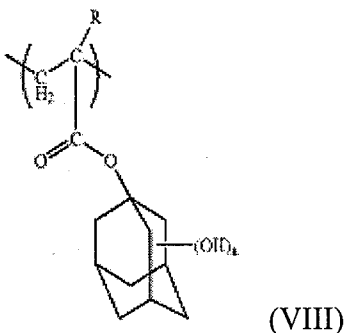
(In the formula, R represents a hydrogen atom or a methyl group; R¹² represents an ethyl group; X represents a group which, in combination with a carbon atom to which said group R¹² is bonded, forms a group in which one hydrogen atom has been removed from a cyclohexyl group).

- Structural unit (a2-1)



(In the formula, R represents a hydrogen atom or a methyl group).

- Structural unit (a3)



(In the formula, R represents a hydrogen atom or a methyl group; and n is 1, and the hydroxyl group is bonded to position 3 of the adamantyl group).

In JP'001, all of the examples use polycyclic aliphatic hydrocarbon groups as the acid dissociable, dissolution inhibiting group. Therefore, all of the resins which are specifically

disclosed in JP'001 cannot attain the effects of the present invention. Furthermore, with respect to the structural units (a2) and (a3), JP'001 describes a great variety of examples. Claim 1 as amended recites that the resin contains a combination of specific structural units. The Examples in the present specification describe that the positive resist composition including the combination of the structural units recited in the present claims can attain the unexpected results described above (Table 4), as compared with resins such as those shown in JP'001.

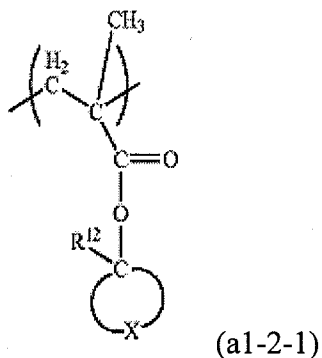
As described above, JP'001 describes a great variety of examples for each structural unit, and does not disclose the specific resin of amended claim 1. Also, all the resins specifically disclosed in JP'001 have a polycyclic aliphatic group as an acid dissociable, dissolution inhibiting group, and thus do not have the unexpected effects of the presently claimed resins. Therefore, it would not be obvious to one of ordinary skill in the art to select the specific structural units recited in present claim 1 from among the numerous possible combinations of structural units described in JP'001, with a reasonable expectation that the unexpected effects of the present invention could be attained.

These unexpected results are neither disclosed nor suggested by the cited reference, nor could they have been predicted based on this reference. Thus, the claimed invention provides unexpected results, which are strong evidence of the nonobviousness of the claimed invention, and would effectively rebut and *prima facie* case of obviousness, even if one were present.

The invention of claim 8 is a resin for a resist, comprising structural units (a) derived from an (α -lower alkyl)acrylate ester as a principal component, wherein

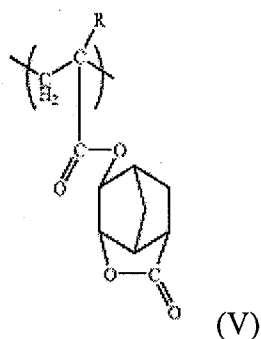
said structural units (a) comprise structural units (a1) derived from an (α -lower alkyl)acrylate ester comprising an acid dissociable, dissolution inhibiting group, structural units (a2) derived from an (α -lower alkyl)acrylate ester comprising a lactone-containing monocyclic or polycyclic group, and structural units (a3) derived from an (α -lower alkyl)acrylate ester that comprises a polar group-containing aliphatic hydrocarbon group, wherein

said structural units (a1) comprise structural units (a1-2-1) represented by general formula (a1-2-1) shown below:

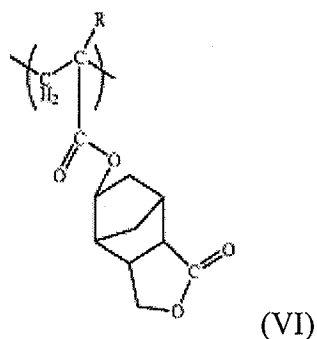


(wherein, R^{12} represents an ethyl group, and X represents a group which, in combination with a carbon atom to which said group R^{12} is bonded, forms a group in which one hydrogen atom has been removed from a cyclohexyl group),

said structural units (a2) are structural units represented by general formula (V) or (VI) shown below:

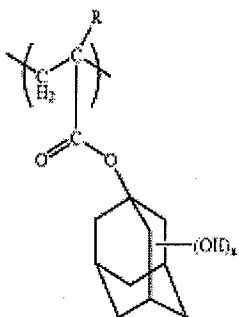


(wherein, R represents a hydrogen atom or a methyl group);



(wherein, R represents a hydrogen atom or a methyl group), and

said structural units (a3) are structural units represented by general formula (VIII) shown below:



(VIII)

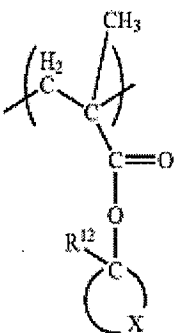
(wherein, R is a hydrogen atom or a methyl group; and n represents an integer of 1, and the hydroxyl group is bonded to position 3 of the adamantyl group).

As discussed above in relation to claim 1, JP'001 does not disclose a resin comprising the specific combination of structural units as recited in amended claim 8. Therefore, claim 8 is not anticipated by this reference. In addition, claim 1 is not obvious over this reference for the reasons provided below.

As described above, as long as the invention of JP'001 contains the two indispensable structural units (i.e. aliphatic hydrocarbon groups), the effects of JP'001 can be attained even if any structure may be selected from among a great variety of examples as each structural unit included in the resin component.

In contrast, the resin recited in amended claim 8 unexpectedly results in improvement of the problem that "resists that use a base resin containing the aforementioned type of polycyclic aliphatic hydrocarbon group as a protective group do not provide entirely satisfactory levels of resolution or depth of focus", by using the following components:

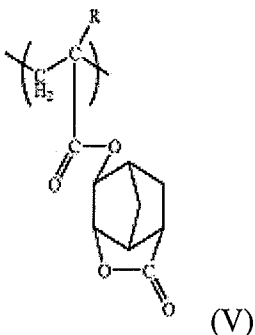
- Structural unit (a1)



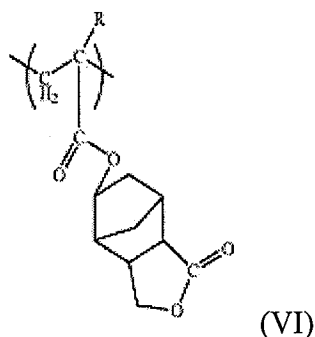
(a1-2-1)

(In the formula, R¹² represents an ethyl group, and X represents a group which, in combination with a carbon atom to which said group R¹² is bonded, forms a group in which one hydrogen atom has been removed from a cyclohexyl group).

- Structural unit (a2)

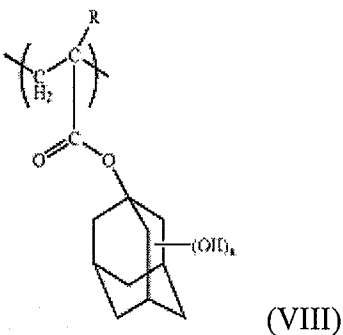


(In the formula, R represents a hydrogen atom or a methyl group), or



(In the formula, R represents a hydrogen atom or a methyl group).

- Structural unit (a3)



(In the formula, R is a hydrogen atom or a methyl group; and n represents an integer of 1, and the hydroxyl group is bonded to position 3 of the adamantyl group).

Thus, among all of the acid dissociable, dissolution inhibiting group provided in JP'001, if a polycyclic aliphatic hydrocarbon group is used, the beneficial effects of the presently claimed resin cannot be attained. In JP'001, all of the examples use polycyclic aliphatic hydrocarbon groups as the acid dissociable, dissolution inhibiting group. Therefore, none of these resins can attain effects. Furthermore, with respect to the structural units (a2) and (a3), JP'001 describes a

great variety of examples. As described above in relation to claim 1, claim 8 as amended recites that the resin contains a combination of specific structural units, and it is clearly disclosed in the Examples of the present application that the positive resist composition including the combination of these structural units can attain the unexpected, beneficial effects described above, as compared to resins such as those described in JP'001.

A Rule 132 Declaration of Hideo Hada, one of the inventors of the present application, is enclosed herewith in order to support the above arguments. This Declaration focuses on the case in which the structural unit represented by general formula (V) is included, because the case where the structural unit represented by general formula (VI) is included is shown in Examples of the present application. This Declaration shows that the resin recited in claim 8 results in unexpectedly improved resolution, depth of focus and mask error factor. The Declaration also illustrates that even if structural unit (V) is used as the structural unit (a2), that these beneficial effects are not obtained if a structural unit is used which includes an acid dissociable, dissolution inhibiting group containing a polycyclic aliphatic hydrocarbon group as required by JP'001, instead of a cyclohexyl group. This data further support Applicants' contention that the specific combination of structural units recited in present claim 8 results in the unexpected advantages described above.

As described above, JP'001 describes a great variety of examples for each structural unit, and does not disclose the specific resin of amended claim 1. Also, all the resins specifically disclosed in JP'001 have a polycyclic aliphatic group as an acid dissociable, dissolution inhibiting group, and thus do not have the unexpected effects of the presently claimed resins. Therefore, it would not be obvious to one of ordinary skill in the art to select the specific structural units recited in present claim 1 from among the numerous possible combinations of structural units described in JP'001, with a reasonable expectation that the unexpected effects of the present invention could be attained.

These unexpected results are neither disclosed nor suggested by the cited reference, nor could they have been predicted based on this reference. Thus, the claimed invention provides unexpected results, which are strong evidence of the nonobviousness of the claimed invention, and would effectively rebut and *prima facie* case of obviousness, even if one were present. Since claims 4-7 and 11-14 depend either directly or indirectly on claim 8, they are also not anticipated or rendered obvious by JP'001, and should therefore be allowable.

US 2002/0068238

Claims 1, 3-8, 10-14 and 16-17 were rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by US 2002/0068238. The features of canceled claims 2 and 9, which were not rejected as being anticipated by this reference, have been incorporated into claims 1 and 8, respectively. Therefore, claims 1 and 8 cannot be anticipated by this reference. Since the remaining claims depend either directly or indirectly on claims 1 or 8, these claims are also not anticipated by this reference. In addition, US 2002/0068238 does not suggest the feature of canceled claims 2 and 9 which is now recited in amended claims 1 and 8, respectively. Therefore, these claims, as well as claims 4-7 and 11-14 which depend either directly or indirectly on these claims, cannot be rendered obvious by this reference.

In addition, US 2002/0068238 describes a positive-working photoresist composition which comprises, as a uniform solution in an organic solvent:

(A) 100 parts by weight of a resinous compound capable of being imparted with increased solubility in an aqueous alkaline solution by interaction with an acid;

(B) from 0.5 to 30 parts by weight of a radiation-sensitive acid generating compound capable of generating an acid by irradiation with a radiation; and

(C) an organic solvent in an amount sufficient to dissolve the components (A) and (B),

the component (A) being a copolymer consisting of the monomeric units of:

(a1) from 20 to 80% by moles of 2-alkyl-2-adamantyl (meth)acrylate units,

(a2) from 10 to 60% by moles of 2-oxooxapentyl (meth)acrylate units, and

(a3) from 10 to 60% by moles of 1-hydroxyadamantyl (meth)acrylate units.

In US 2002/0068238 8, as described above, 2-alkyl-2-adamantyl (meth)acrylate units are used as the structural unit which contains an acid dissociable, dissolution inhibiting group. Therefore, US'238 has a structural unit including an acid dissociable, dissolution inhibiting group which contains a **polycyclic** aliphatic hydrocarbon group as an indispensable component.

In the Office Action at page 7, item 25(d), the Examiner alleges that:

acrylates according to instant formula (a1-1) and (a1-1-1) in which the acid dissociable dissolution inhibiting group may be monocyclic (see cyclohexyl (meth)acrylate at paragraph 28).

However, cyclohexyl (meth)acrylate is NOT dissociated under action of an acid. That is, cyclohexyl (meth)acrylate is merely described as an example of a variety of other ethylenically

unsaturated monomeric carboxylic acid compounds including (meth)acrylic acid derivatives containing a functional group known to exhibit an effect of dry-etching resistance or non-acid-dissociable solubility-reducing group which may be further mixed in the mixture of the comonomers which correspond with the structural units above (paragraphs [0027] and [0028] of US 2002/0068238).

Thus, the invention of US'238 indispensably uses a structural unit including an acid dissociable, dissolution inhibiting group which contains a polycyclic aliphatic hydrocarbon group, that is, "2-alkyl-2-adamantyl (meth)acrylate units". Therefore, the resin of US 2002/0068238 clearly contains different components compared to present claims 1 or 8. Thus, claims 1 and 8, as well as claims 4-7 and 11-14, which depend either directly or indirectly on these claims, are not anticipated (or rendered obvious) by this reference.

In view of the comments presented above, Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. §102(b).

CONCLUSION

Applicants submit that all claims are in condition for allowance. However, if minor matters remain which could be resolved by telephone, the Examiner is invited to contact the undersigned at the telephone number provided below. If any additional fees are required, please charge these to Deposit Account No. 11-1410. Should there be any questions concerning this application, the Examiner is respectfully invited to contact the undersigned at the telephone number appearing below.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: 6/1/09

By: 

Neil S. Bartfeld, Ph.D.
Registration No. 39,901
Agent of Record
Customer No. 20,995
(619) 235-8550